

(19) World Intellectual Property
Organization
International Bureau



31 MAY 2005



(43) International Publication Date
8 July 2004 (08.07.2004)

PCT

(10) International Publication Number
WO 2004/056898 A3

- (51) International Patent Classification⁷: **C08F 293/00**, C09J 153/00, C08L 53/00
- (21) International Application Number: PCT/EP2003/014658
- (22) International Filing Date: 19 December 2003 (19.12.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 02028900.5 23 December 2002 (23.12.2002) EP
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- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:
— with international search report
- (88) Date of publication of the international search report: 11 November 2004
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: ADHESIVES

(57) Abstract: There are disclosed star shaped thermoplastic elastomers made of acrylic block copolymers obtained by transition metal catalysed radical polymerisation. The elastomers comprise core arms obtained from monomers or mixture of monomers, whose T_g is from about -65°C to about -20°C , and of shell arms obtained from monomers or mixture of monomers, whose T_g is from about 70°C to about 160°C . The core copolymer has a polydispersity of 2 or higher and the final copolymer has a polydispersity of from 3 to 10.

WO 2004/056898 A3

INTERNATIONAL SEARCH REPORT

International Publication No

PCT/EP 03/14658

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C08F293/00 C09J153/00 C08L53/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C08F C08L C09J C09D C08G C08K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	US 2003/013790 A1 (HUSEMANN ET AL) 16 January 2003 (2003-01-16) * page 2 para. 30 ; page 2, para. 22-27 ; page 3, para. 37 - page 4, para. 73 *	1-10
X	US 5 399 620 A (NIESSNER NORBERT ET AL) 21 March 1995 (1995-03-21) * column 2, line 45-52 ; column 1, line 57-68 ; column 2, line 57 - column 3, line 1 ; abstract ; column 2, line 31-40 *	1-10
X	EP 0 243 120 A (DU PONT) 28 October 1987 (1987-10-28) * page 7, line 25-30 ; page 5, line 15-35 ; page 12, line 1-8 ; claim 1 *	1-10
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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search

28 April 2004

Date of mailing of the international search report

23. 08. 2004

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 03/14658

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00/43344 A (RIME FRANCOIS ; CIBA SC HOLDING AG (CH); MUEHLEBACH ANDREAS (CH)) 27 July 2000 (2000-07-27) * examples 5, 6 ; page 7, line 1 - page 8, line 6 ; page 12, line 3 - page 13, line 5 ; claims 1-15 *	1-10
X	US 6 310 175 B1 (YOSHIDA MASATOSHI ET AL) 30 October 2001 (2001-10-30) * claim 1 ; column 1, line 5-10 ; column 5, line 55-59 ; column 6, line 25-39, 15-24 ; examples and tables ; claims 2-10 ; column 5, line 16-25 ; abstract *	1-10
X	US 6 288 173 B1 (BARKAC KAREN A ET AL) 11 September 2001 (2001-09-11) * column 11, line 53-56 ; column 6, line 16 "ethyl acrylate" ; column 6, line 12-26 ; column 4, line 38-43 ; column 8, line 62-65 *	1-10
X	WO 86/00626 A (DU PONT) 30 January 1986 (1986-01-30) * abstract ; page 14, line 33 - page 16, line 29 ; claims 1-11 ; page 5, line 11 - page 14, line 30 ; example 23 *	1-10
X	WO 92/07014 A (DU PONT) 30 April 1992 (1992-04-30) claims 21, 26, 28-30, 34 ; page 23, line 5-20 ; page 18, line 1-5 ; page 19, line 31 - page 20, line 32 ; page 35, line 17-29 *	1-10
X	US 2002/115798 A1 (NARAYAN-SARATHY ET AL) 22 August 2002 (2002-08-22) * abstract ; claims 6,5,1-21 ; page 1, para.14 ; page 2, para.18 *	1,3,4, 6-10
X	US 5 756 585 A (FAYT ROGER ET AL) 26 May 1998 (1998-05-26) * abstract ; claims 1-29 *	1-10
A	WO 00/39233 A (HAESE FRANCOIS C D ; MA JINGJING (US); EVERAERTS ALBERT I (US); MINNES) 6 July 2000 (2000-07-06) * page 5, line 28 ; page 11, line 6-11 *	1-10
A	US 6 162 882 A (MATYJASZEWSKI KRZYSZTOF ET AL) 19 December 2000 (2000-12-19) * abstract ; column 1, line 25-35 ; column 7, line 51 - column 9, line 38 *	1-10

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INTERNATIONAL SEARCH REPORT

International Publication No

PCT/EP 03/14658

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>US 5 763 548 A (MATYJASZEWSKI KRZYSZTOF ET AL) 9 June 1998 (1998-06-09) * abstarct ; column 6, line 30 ; column 14, line 1-30 * -----</p>	1-10

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP 03/14658

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1 - 10

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-10

A branched polymer product comprising an acrylic copolymer comprising one or more core arm(s) comprising one or more core polymer(s) and one or more shell arm(s) comprising one or more shell polymer(s) as detailed in the application claim 1.

The present claim 1 is a product-by-process claim and thus the product has been treated according to Guidelines, C, III, 4.7b for "product-by-process".

2. claims: 11-19

A method for producing a branched polymer comprising the process steps (a) - (e) as described in claim 11.

3. claims: 20-23

An adhesive composition comprising a branched copolymer as claimed in any of the claims 1-10.

4. claim: 24

A composition comprising 2 or more incompatible acrylic polymers together with a compatibilising agent as described in claim 24.

5. claim: 25

The use of a polymer as claimed in any of the claims 1-10 as a compatibilising agent for 2 or more incompatible acrylic polymers.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 03/14658

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2003013790	A1	16-01-2003	DE 10129611 A1 09-01-2003 EP 1270701 A2 02-01-2003 JP 2003055631 A 26-02-2003
US 5399620	A	21-03-1995	DE 4139962 A1 09-06-1993 DE 59203105 D1 07-09-1995 EP 0545184 A2 09-06-1993
EP 0243120	A	28-10-1987	AT 84809 T 15-02-1993 AU 591769 B2 14-12-1989 AU 7155187 A 22-10-1987 BR 8701765 A 02-02-1988 CA 1323715 C 26-10-1993 DE 3783642 D1 04-03-1993 DE 3783642 T2 03-06-1993 DK 198187 A 19-10-1987 EP 0243120 A2 28-10-1987 ES 2037710 T3 01-07-1993 JP 7086161 B 20-09-1995 JP 62252449 A 04-11-1987 MX 168843 B 11-06-1993 NO 871616 A 19-10-1987 US 5003004 A 26-03-1991 ZA 8702756 A 28-12-1988
WO 0043344	A	27-07-2000	AU 2436100 A 07-08-2000 CA 2359946 A1 27-07-2000 WO 0043344 A1 27-07-2000 EP 1144355 A1 17-10-2001 JP 2002535423 T 22-10-2002
US 6310175	B1	30-10-2001	EP 1094086 A1 25-04-2001
US 6288173	B1	11-09-2001	AU 6047700 A 28-12-2000 BR 0012106 A 12-03-2002 CA 2376006 A1 14-12-2000 EP 1185571 A2 13-03-2002 JP 2003501517 T 14-01-2003 JP 2004099907 A 02-04-2004 WO 0075791 A2 14-12-2000
WO 8600626	A	30-01-1986	AT 48005 T 15-12-1989 AU 583045 B2 20-04-1989 AU 4547585 A 10-02-1986 BR 8506816 A 25-11-1986 CA 1253271 A1 25-04-1989 DE 3574260 D1 21-12-1989 DK 98486 A 04-03-1986 EP 0188539 A1 30-07-1986 ES 8700865 A1 01-02-1987 HK 24390 A 06-04-1990 JP 6067969 B 31-08-1994 JP 61502610 T 13-11-1986 KR 9102473 B1 23-04-1991 NO 860802 A 04-03-1986 NO 167869 B 09-09-1991 WO 8600626 A1 30-01-1986 US 4659782 A 21-04-1987

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 03/14658

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 8600626	A	US 4659783 A ZA 8505083 A US 4695607 A US 4794144 A US 4810756 A	21-04-1987 25-03-1987 22-09-1987 27-12-1988 07-03-1989
WO 9207014	A 30-04-1992	AU 8844191 A WO 9207014 A1 US 5371147 A	20-05-1992 30-04-1992 06-12-1994
US 2002115798	A1 22-08-2002	NONE	
US 5756585	A 26-05-1998	FR 2649400 A1 AT 103943 T CA 2063402 A1 DD 296497 A5 DE 69007884 D1 DE 69007884 T2 DK 408420 T3 EP 0408420 A1 ES 2063307 T3 WO 9100882 A1 JP 7025858 B JP 5500827 T	11-01-1991 15-04-1994 11-01-1991 05-12-1991 11-05-1994 03-11-1994 18-07-1994 16-01-1991 01-01-1995 24-01-1991 22-03-1995 18-02-1993
WO 0039233	A 06-07-2000	WO 0039233 A1 AU 2097799 A EP 1144534 A1 JP 2002533556 T US 6734256 B1	06-07-2000 31-07-2000 17-10-2001 08-10-2002 11-05-2004
US 6162882	A 19-12-2000	US 6111022 A US 5945491 A US 5789487 A US 6124411 A AU 3585997 A BR 9710273 A CA 2259995 A1 CN 1228789 A ,B EP 0914352 A1 ID 18724 A JP 2000514479 T KR 2000023686 A TW 397852 B TW 552285 B WO 9801480 A1	29-08-2000 31-08-1999 04-08-1998 26-09-2000 02-02-1998 10-08-1999 15-01-1998 15-09-1999 12-05-1999 07-05-1998 31-10-2000 25-04-2000 11-07-2000 11-09-2003 15-01-1998
US 5763548	A 09-06-1998	AU 720512 B2 AU 5306996 A BR 9604887 A CA 2216853 A1 CN 1183107 A EP 0817806 A1 JP 3040172 B2 JP 10509475 T TW 520380 B US 6407187 B1 WO 9630421 A1	01-06-2000 16-10-1996 30-11-1999 03-10-1996 27-05-1998 14-01-1998 08-05-2000 14-09-1998 11-02-2003 18-06-2002 03-10-1996

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 03/14658

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5763548	A	US 2002193538 A1	19-12-2002
		US 6512060 B1	28-01-2003
		US 6541580 B1	01-04-2003
